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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/724,734	11/28/2000	Stephen M. Trimberger	X-805-8 US	7773

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XILINX, INC
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EXAMINER

LEMMA, SAMSON B

ART UNIT PAPER NUMBER

2132

DATE MAILED: 10/20/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/724,734

Applicant(s)

TRIMBERGER ET AL.

Examiner

Samson B Lemma

Art Unit

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 28 November 2000.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-20 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-20 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on 28 November 2000 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| Paper No(s)/Mail Date <u>11/28/2000</u> . | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

1. Claims **1-20** have been examined.

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. **Claims 1-5 and 9-14,16,17** are rejected under 35 U.S.C. 103(a) as being unpatentable over Stephen M. Trimberger (hereinafter referred as Trimberger) (U.S. Patent No 5,892,961) in view of Erickson et al (hereinafter referred to as Erickson) (U.S. Patent No. 6,212,639)

4. **As per claim 1, Trimberger** discloses

- A bit stream for configuring a PLD with an encoded design comprising:
(Column 2, lines 40-49; column 4, lines 10-21) (The design of the PLD which is in the form of encoded bitstream includes the programming instruction and the configuration data for configuring the PLD or the "FPGA" as explained on column 2, lines 40-49; column 4, lines 10-21)

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- A plurality of unencrypted words for controlling loading of configuration data; (Figure 3, column 5, lines 1-31; column 5, lines 44-60) (The submitted disclosure on page 11, lines 13-15, and on figure 2d and figure 4d by the applicant teaches the control words or data with a particular configuration logic register addresses are used for controlling the loading of the configuration data. Example given by the applicant such as bitstream header configuration address "0001" which represents the frame address is used for controlling the loading of configuration data. In fact all the configuration addresses shown on figure 2d and figure 4d with the exception of the configuration address "0010" and "0011" are considered and explained to be control data by the applicant since they are used for controlling loading of configuration data as explained on the submitted disclosure on page 11, lines 13-15. **Trimberger** on figure 3 and column 5, lines 1-31; column 5, lines 44-60 discloses a plurality of unencrypted bitstream or words which includes encoded instruction and then decoded by the CPU. These plurality of unencrypted words contains the op codes which represents a particular instruction used for controlling the loading of configuration data. For instance the word or bitstream which contains the "LF" op code which represents the instruction "Load Frame Immediate" is decoded by the CPU and this unencrypted word is used for controlling the configuration data by loading the data word onto the frame data path as explained on column 5, lines 1-14. On the top of that the unencrypted word or decoded word that contains the op codes "LFN N", represents "Load N bits", into frame register is also used for controlling the configuration data by loading these N bits onto the frame data path as explained on column 5, lines 15-20) and

Trimberger does not explicitly disclose

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- A plurality of encrypted words specifying the encrypted design.

However, in the same field of endeavor, **Erickson** discloses

A plurality of encrypted words or information or configuration data or design is transmitted from the storage device to the PLD and these encrypted words are used for specifying the encrypted design or the encrypted configuration data such that when the encrypted design or the encrypted configuration data is decrypted at the PLD, the resulting information is used for configuring the PLD.(Column 1, lines 65-67; Column 2, lines 1-13)

It would have been obvious to one having ordinary skill in the art, at the time the invention was made, to substitute a plurality of encrypted words specifying the encrypted design for the encoded design control words of Trimberger as per teaching of Erickson in order to secure the configuration data.

5. **As per claim 2, Trimberger** on figure 3 and column 5, lines 1-31; column 5, lines 44-60 discloses the a plurality of unencrypted or decoded bitstream or words which includes instructions which are decoded or unencrypted by the CPU and these plurality of unencrypted words contains the op code which represents a particular instruction used for controlling the loading of configuration data. Example the word or bitstream which contains the "LF" op code which represents the instruction "Load Frame Immediate" is decoded by the CPU and this decoded or unencrypted word is used for controlling the configuration data by loading the data word onto the frame data path as explained on column 5, lines 1-14)(figure 3, Column 5, lines 1-31; column 5, lines 44-60)

Trimberger further discloses that the exemplary instruction which is found by decoding the encoded bitstream or words and the result of which is decoded or unencrypted bitstream contains op codes which represents a particular instruction are

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listed on figure 3, but does not represent the totality of possible instructions which the CPU 40 can decode and implements. (Column 5, lines 54-61)

Trimberger does not explicitly disclose

- The bitstream of Claim 1 wherein one of the unencrypted words comprises a key address for locating a decryption key for decrypting the encrypted words

However, in the same field of endeavor, **Erickson** discloses

The decryption circuit uses or locate the decryption key from the security initialization circuit to decrypt the encrypted configuration data or word .

(Column 3, lines 36-39)

It would have been obvious to one having ordinary skill in the art, at the time the invention was made, to employ the locating of the decryption key for decrypting the encrypted word as per teachings of Erickson in to the method of as taught by Trimberger for the purpose of decrypting the encrypted control words.

6. **As per claim 3,** the combination of Trimberger and Erickson discloses the bitstream as applied to claim 1 above. Furthermore, Trimberger discloses the bitstream wherein one of the unencrypted words comprises an address register for loading the first word of the encoded design.(Column 2, lines 20-23)

7. **As per claim 4 and 5,** the combination of Trimberger and Erickson discloses the bitstream as applied to claims 1 and 4 above. Furthermore, Trimberger discloses the bitstream comprising a plurality of encrypted words for controlling loading of configuration data, wherein one of the encrypted words for controlling loading of configuration data specifies an address for loading a word of the encrypted

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design.(Figure 3, Column 5, lines 32-43) (The submitted disclosure on page 11, lines 10-13, and on figure 2d and figure 4d by the applicant teaches the word or data with a particular configuration logic register addresses namely addresses “0010” or Frame Data Input or “0011” or Frame Data Output are used for specifying the encrypted design. **Trimberger** discloses a plurality of encoded words shown on figure 3 which carries instructions such as “RD X” which instruct the CPU to read and the encoded word or data which contains the “RB” op code which represents read back instruction are both received by the CPU and used for specifying the encoded design as explained on column 5, lines 32-43 and shown on figure 3. On the top of that Erickson describes that these encoded words or data which contains the configuration data are actually encrypted as explained on column 1, lines 65-67; column 2, lines 1-13)

8. **As per claim 9, Trimberger** discloses a bitstream for configuring a plurality of PLDs comprising:
- A first plurality of words for controlling loading of configuration data into a first PLD; (figure 3, Column 5, lines 1-31; column 5, lines 44-60) (The submitted disclosure on page 11, lines 13-15, and on figure 2d and figure 4d by the applicant teaches the control word or data with a particular configuration logic register addresses are used for controlling the loading of the configuration data. Example bitstream header configuration address “0001” which represents the frame address is used for controlling the loading of configuration data. In fact all the configuration addresses shown on figure 2d and figure 4d with the exception of the configuration address “0010” and “0011” are considered by the applicant to be control data and used for controlling loading of configuration data as explained on the submitted disclosure on page 11, lines 13-15.
- Trimberger** on figure 3 and column 5, lines 1-31; column 5, lines 44-60 discloses a plurality of unencrypted bitstream or words which includes encoded

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instructions and decoded by the CPU. These plurality of unencrypted words contains the op code which represents a particular instruction used for controlling the loading of configuration data. Example. The word or bitstream which contains the "LF" op code which represents the instruction "Load Frame Immediate" is decoded by the CPU and the unencrypted word is used for controlling the configuration data by loading the data word onto the frame data path and On the top of that other words which contains the op codes used for controlling the configuration is enumerated on figure 3 and is explained on column 5, lines 1-14) and

- A first plurality of words specifying a design for loading into the first PLD (figure 3, Column 5, lines 32-43) (The submitted disclosure on page 11, lines 10-13, and on figure 2d and figure 4d by the applicant teaches the word or data with a particular configuration logic register address namely addresses "0010" or Frame Data Input or "0011" or Frame Data Output are used for specifying the encrypted design. **Trimberger** discloses a plurality of encoded words which contains instructions "RD X" instruct the CPU to read. And encoded word which contains the "RB" opcode which represents read back instruction are both received by the CPU and used for specifying the encrypted design as shown on figure 3 and explained column 5, lines 32-43.)
- Furthermore Trimberger discloses at least one of the first and second pluralities of words specifying a design is encoded.(figure 3, Column 5, lines 32-43) (As explained above the first plurality of words specifying a design is encoded before they are decoded by the CPU)

Trimberger does not explicitly disclose

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- A second plurality of words for controlling loading of configuration data into a second PLD; and
- A second plurality of words specifying a design for loading into the second PLD;
- Wherein at least one of the first and second pluralities of words specifying a design is encrypted.

However, in the same field of endeavor, **Erickson** discloses a plurality of PLDs are chained together during configuration modes. Erickson further discloses how the encrypted configuration data or word is transmitted from one PLDs to the next or the other PLDs in chain. (column 2, lines 33-46 and figure 4, column 9, lines 56-63; column 9, lines 44-50). Furthermore Erickson discloses the pluralities of words or information or data that specifies the configuration data or the design is encrypted. (Column 1, lines 65-67; column 2, lines 1-11; column 34-41)

Accordingly, It would have been obvious to one having ordinary skill in the art, at the time the invention was made, to introduce encrypted bitstream for configuring a plurality of PLDs chained to each other as per teaching of Erickson in to the method as taught by Trimberger, in order to provide the functionality of supporting the secured configuration of the plurality of PLDs to be linked or daisy-chained to each other and communicate the configuration data or the design data at the same time as well as to secure the design of the PLD by encrypting the bitstream so that it will be more difficult to be copied.

9. **As per claims 10 and 11**, the combination of Trimberger and Erickson discloses the bitstream as applied to claim 9 above. Furthermore, Erickson discloses the bitstream, wherein the first plurality of words specifying a design for loading into

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the first PLD is unencrypted or decoded and the second plurality of words specifying a design for loading into the second PLD is encrypted or vice versa.(Column 2, lines 33-45 ; column 1, lines 58-61; column 9, lines 44-50) (The submitted disclosure on page 11, lines 10-13, and on figure 2d and figure 4d by the applicant teaches the word or data with a particular configuration logic register address namely addresses "0010" or Frame Data Input or "0011" or Frame Data Output are used for specifying the encoded design. Trimberger discloses a plurality of encoded words contains the instructions "RD X" instructs the CPU to read and also contains encoded word which contains the "RB" opcode which represents read back instruction and both are received by the CPU and decoded and used for specifying the encoded design as explained on figure 3, column 5, lines 32-43 and Erickson describes how one PLD is chained with the other PLD for specifying a design as explained column 2, lines 33-45 and Erickson also teaches that the word for specifying the design is encrypted at column 1, lines 65-67 and the combination of the two references meets the recitation of the claim.)

10. **As per claim 12**, the combination of Trimberger and Erickson discloses the bitstream as applied to claim 9 above. Furthermore, Erickson discloses the bitstream, wherein both the first and the second plurality of words specifying a design is encrypted. (Column 2, lines 33-45 ; column 1, lines 58-61; column 9, lines 44-50)

11. **As per claim 13**, the combination of Trimberger and Erickson discloses the bitstream as applied to claim 12 above. Furthermore, Erickson discloses the bitstream, wherein the first plurality of words for specifying a design for loading into the first PLD are encrypted with a first key and the second plurality of words specifying a design for loading into the second PLD are encrypted with a second key. (Column 2, lines 33-45; column 1, lines 58-61; column 9, lines 44-50)

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12. **As per claim 14**, the combination of Trimberger and Erickson discloses the bitstream as applied to claim 1 above. Furthermore, Erickson discloses the bitstream, wherein the plurality of encrypted words further specify an address into which the encrypted design is to be loaded.(Column 3, lines 34-41)(the configuration logic elements could specifies the address for the purpose of configuring the PLD and meets the recitation of this claim).

13. **As per claim 16 and 17**, the combination of Trimberger and Erickson discloses the bitstream as applied to claim 1 above. Furthermore, Trimberger discloses the bitstream, wherein the plurality of encoded words specifying the encoded design are loaded into a single group or a plurality of groups of successive addresses. (Column 2, lines 49-54; Column 5, lines 15-21; Column 5, lines 21-31)(Erickson on the top of that discloses that the encoded words can actually be encrypted as explained on column 1, lines 65-67; column 2, lines 1-13 and the combination of the two meets the recitation of the claim)

14. **Claims 6-8** are rejected under 35 U.S.C. 103(a) as being unpatentable over Stephen M. Trimberger (hereinafter referred as **Trimberger**) (U.S. Patent No 5,892,961) in view of Erickson et al (hereinafter referred to as Erickson) (U.S. Patent No. 6,212,639) further in view of Kwiat (hereinafter referred to as **Kwiat**) (U.S. Patent No. 5,931,959)

15. **As per claim 6**, The combination of Trimberger and Erickson discloses a plurality of unencrypted bitstream or words which includes encoded instruction and decoded by the CPU and these plurality of unencrypted words contain the opcode which represents a particular instruction used for controlling the loading of configuration data. Example. The word or bitstream which contains the "LF" opcode which represents the instruction "Load Frame Immediate" is decoded by the CPU and this unencrypted word is used for controlling the configuration data by loading the data word onto the

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frame data path as explained on column 5, lines 1-14)(figure 3, Column 5, lines 1-31; column 5, lines 44-60)

The combination of Trimberger and Erickson does not explicitly disclose

- The bitstream wherein the unencrypted words for controlling loading of configuration data include a cyclic redundancy checksum for comparison to a cyclic redundancy checksum calculated by the PLD.

However, in the same field of endeavor, **Kwiat** discloses a cyclic redundancy checksum for comparison to a cyclic redundancy checksum calculated by the PLD.(Column 10, lines 50-55)

It would have been obvious to one having ordinary skill in the art, at the time the invention was made, to combine a Cyclic redundancy checksum (CRC) as per teaching of Kwiat in to the method of as taught by the combination of Trimberger and Erickson, in order to increase the chance of providing error free configuration of the PLD or FPGA when the design in the form of bitstream is loaded on to the PLD or FPGA.

16. **As per claims 7 and 8**, the combination of Trimberger , Erickson and Kwiat discloses the bitstream as applied to claim 6 above. Furthermore, Kwiat discloses the bitstream, wherein the cyclic redundancy checksum in the bitstream is calculated on configuration data after or before the configuration data has been encrypted. .(Column 16, lines 50-55)

17. **Claim 15** is rejected under 35 U.S.C. 103(a) as being unpatentable over Stephen M. Trimberger (hereinafter referred as Trimberger) (U.S. Patent No 5,892,961) in view of Erickson et al (hereinafter referred to as Erickson) (U.S. Patent No. 6,212,639) further in view of John Yin (hereinafter referred as Yin) (U.S. Patent No 6,028,939)

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18. **As per claim 15**, the combination of Trimberger and Erickson, discloses the a plurality of unencrypted bitstream or words which includes encoded instruction and decoded by the CPU and these plurality of unencrypted words contain the opcode which represents a particular instruction used for controlling the loading of configuration data. Example. The word or bitstream which contains the "LF" opcode which represents the instruction "Load Frame Immediate" is decoded by the CPU and this unencrypted word is used for controlling the configuration data by loading the data word onto the frame data path as explained on column 5, lines 1-14)(figure 3, Column 5, lines 1-31; column 5, lines 44-60)

The combination of **Trimberger** and **Erickson** does not explicitly disclose The bitstream wherein the plurality of unencrypted words for controlling loading of configuration data include a cipher block chaining initial value.

However, in the same field of endeavor, **Yin** discloses The 64 bit initial vector IV which is shown on figure 2b, ref. Num 42, is starting address for loading a design or predetermined sequences of bits into a PHE OR PLD as explained on column 7, lines 60-65 and column 8, lines 59-67)(Column 5, lines 33-45; column8, lines 59-67; figure 2b, ref. Num 42)

Furthermore Yin discloses

The first word of design "Do" which is shown on figure 2b is combined or Xored with the cipher block initial value which is interpreted by the office to be IV at figure 2, ref. Num "40"(figure 2)

It would have been obvious to one having ordinary skill in the art, at the time the invention was made, to employ the inclusion of cipher block chaining initial value as per teachings of Yin in to the method of as taught by the combination of Trimberger and Erickson for the purpose of strengthening the security of the PLD since a single bit error in a ciphertext block affects the decryption of all subsequent blocks.

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19. **Claims 18-20** are rejected under 35 U.S.C. 103(a) as being unpatentable over Erickson et al (hereinafter referred to as Erickson) (U.S. Patent No. 6,212,639) in view of John Yin (hereinafter referred as Yin) (U.S. Patent No 6,028,939)

20. **As per claim 18, Erickson** discloses

- A method of generating a bit stream with encrypted design data.(Column 1, lines 65-67; Column 3, lines 32-42)

Erickson does not explicitly disclose forming a cipher block chaining encryption.

However, in the same field of endeavor, **Yin** discloses the steps of cipher block chaining of encryption comprising the steps of:

- Forming a cipher block chaining initial value comprising a starting address for loading a design into a PLD; (Column 5, lines 33-45; column 8, lines 59-67; figure 2b, ref. Num 42) (the 64 bit initial vector IV which is shown on figure 2b, ref. Num “42”, is starting address for loading a design or predetermined sequences of bits into a PHE OR PLD as explained on column 7, lines 60-65 and column 8, lines 59-67)
- Combining the cipher block chaining initial value with a first word of design data to form a first combined word; (column 5, lines 33-45; column 8, lines 59-67; figure 2b, ref. Num “40”) (The first word of design “Do” which is shown on figure 2b is combined or XORed with the cipher block initial value which is interpreted by the office to be “IV” to form a first word of design data which is interpreted by the office to be “Co” which is shown at figure 2b, ref Num “Co” meets the recitation of this claim)

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- Encrypting the first combined word to form a first word of encrypted data; (Column 5, lines 33-45; column 8, lines 59-67; figure 2b) (The first combined word which is equivalent to "Co" is XORed on figure 2b, ref. Num 40 with the next encrypted bitstream data "D1" to form a first word of encrypted data which is interpreted by the office to be "C1")
- Combining the first word of encrypted data with a second word of design data to form a second combined word; (Column 5, lines 33-45; column 8, lines 59-67; figure 2b) (As shown on figure 2b, the second word of design data is "Di" is encrypted and XORed with "C1" which is interpreted by the office as the first word of encrypted data to form a second combined word which is interpreted by the office to be "Ci" and this meets the recitation of the claim) and
- Encrypting the second combined word to form a second word of encrypted data. (Column 5, lines 33-45; column 8, lines 59-67; figure 2b) (The second combined word which is interpreted by the office to be "Ci" shown at figure 2b will continue to be XORed with next design encrypted data "Di" and form a second word of encrypted data and this meets the recitation of this claim)

It would have been obvious to one having ordinary skill in the art, at the time the invention was made, to encrypt the control word in chain block mode as per teachings of Yin in to the encryption method as taught by Erickson in order to secure a plurality of models.

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21. **As per claim 19**, the combination of Erickson and Yin discloses the bitstream as applied to claim 1 above. Furthermore, Yin discloses the bitstream wherein, subsequent steps of combining and encrypting are repeated until all design data has been encrypted. (figure 2b; Column 5, lines 33-45; column 8, lines 59-67)

22. **As per claim 20**, the combination of Yin and Erickson discloses the bitstream as applied to claim 1 above. Furthermore, Yin discloses the bitstream wherein, the cipher block chaining initial value comprises further bits not part of the starting address for loading a design into a PLD. (Figure 2b; Column 5, lines 33-45; column 8, lines 59-67)

Conclusion


Any inquiry concerning this communication or earlier communications from the examiner should be directed to Samson B Lemma whose telephone number is 703-305-8745. The examiner can normally be reached on Monday-Friday (8:00 am---4:30 pm).

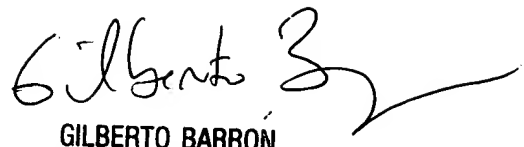
If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, BARRON JR GILBERTO can be reached on 703-305-1830. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

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SAMSON LEMMA


10/08/2004


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